



Plugging In Transportation To Our Energy Future

**Edison Status and Home Energy Storage Update:
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SCE's EV Technical Center



Unique facility in utility industry

DOE Recognition

Largest Fleet Of EVs In US- 300 vehicles, 16 million EV miles

Industry Leading Battery Testing (both Mobile and Stationary)

BEV/PHEV/FCEV testing, evaluation and maintenance capability



Plug-in Vehicles in the Pipeline

Toyota Prius



Ford Escape



Saturn Vue



2010-2012



Daimler Spr

BMW Mini



Daimler Smart



Economic Drivers



- Electricity is Cheaper than Gasoline or Diesel
- Reduced O&M, longer life.
- Initial cost of the vehicle is higher.

- Other benefits
 - Cleaner
 - Domestic
 - Near-term technology
 - Existing infrastructure and unused off-peak production
 - About 10 sources for electricity



Plugging- In To Changing Utility Customer



“Passive Customer ”

- Similar services to all customers
- Customers unaware of energy consumption until monthly bill
- Customers notify utility about outages, no accurate information when problem will be resolved
- Limited utility/customer partnering for load control

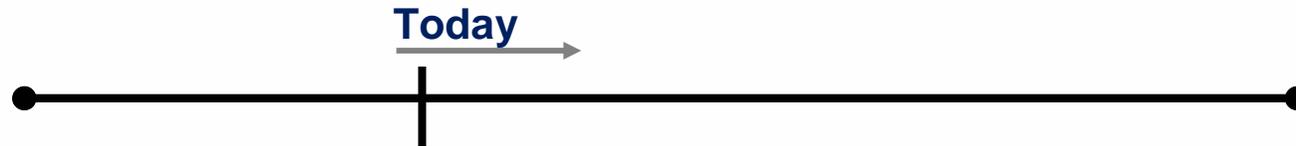
“Informed Customer”

- Advanced meters and price-based DR programs provide energy expenditure options
- Daily customer information about energy consumption
- Utility aware of power outages before customers and proactively notify them
- Broad range of load control options helping customers/ utilities control end-use via HAN (smart appliances, thermostats, PV, PHEVs, energy storage.)

Part of the “Energy System”

- Different service offerings to specific segments based on,
 - Power quality needs
 - Customer energy usage
- Crew location/repair status automatically provided to custs.
- Customer part of the energy supply through microgrids
 - DER such as PV, PHEVs, home energy storage

Grid Technology Innovation



System Fragmented

- Digital and analog/electro-mechanical devices
- Multiple communication protocols and incompatible technologies
- Manual processes and disparate information systems

Evolving Automation

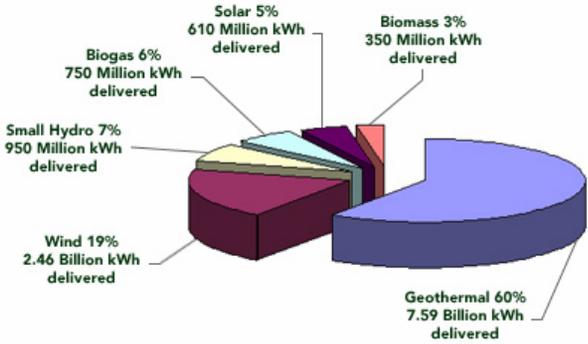
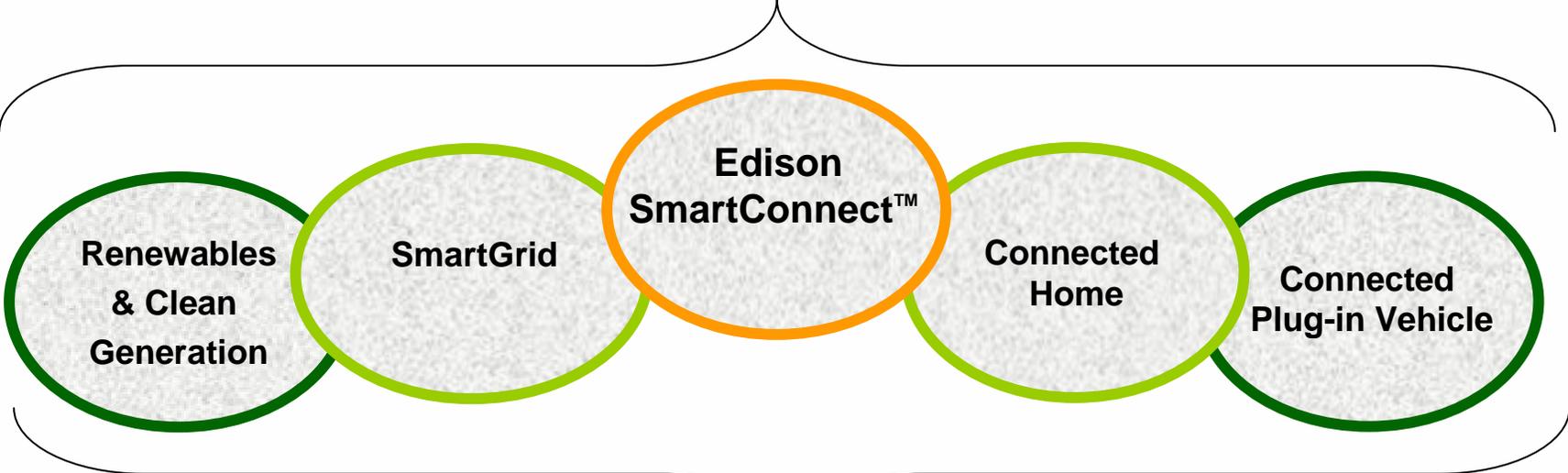
- Some “islands of automation” – with some real-time control
- Increasing data from field devices (AMI, etc) increasing demands on IT and telecom infrastructure

Technology Integration

- Solid-state, digital devices are software programmable, open architecture and networked
- Intelligence and advanced visualization technology enables situational awareness and real time response
- Large-scale deployments of secure broadband communication, high speed computing and data storage

Edison's Vision- Energy Efficiency & Environment

Total Integration of Information, Control and Energy Technologies Delivering Environmental Benefits



Low Carbon Fuel Mix



Energy Management & Efficiency

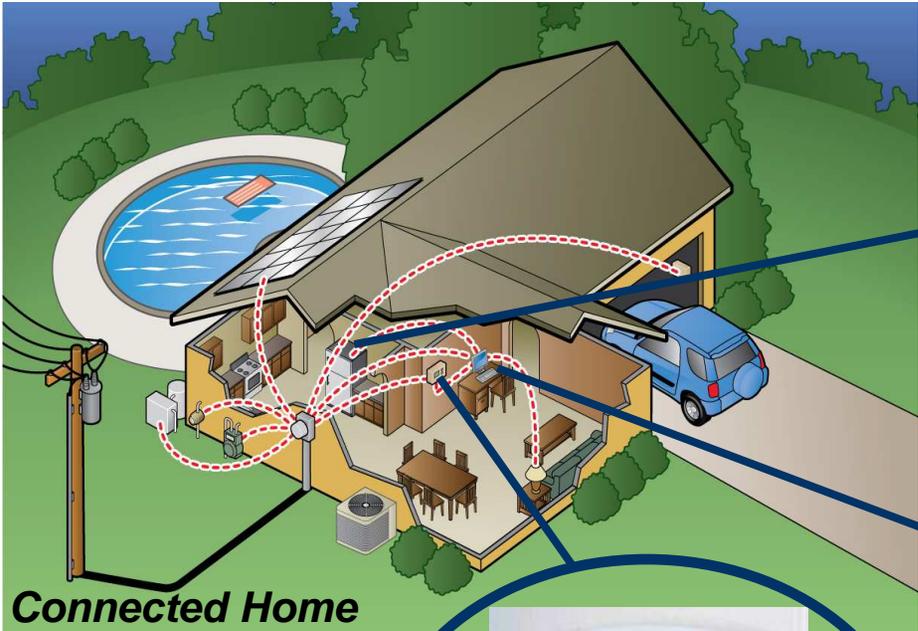
By Empowering Customers



- **Rate choices to manage costs**
 - Time of Use and Tiered Rates
 - Critical Peak Pricing (CPP)
 - Peak Time Rebate (PTR)
 - Programmable Communicating Thermostats (PCT)
- **Energy information and analysis**
- **Service automation-remote turn-on**
- **Billing & Payment options**
- **Communication w/ SmartGrid to detect, avoid & repair grid problems in seconds**



To Reduce Energy Consumption & Demand



Connected Home



Customer enabled automated response thru energy smart appliances

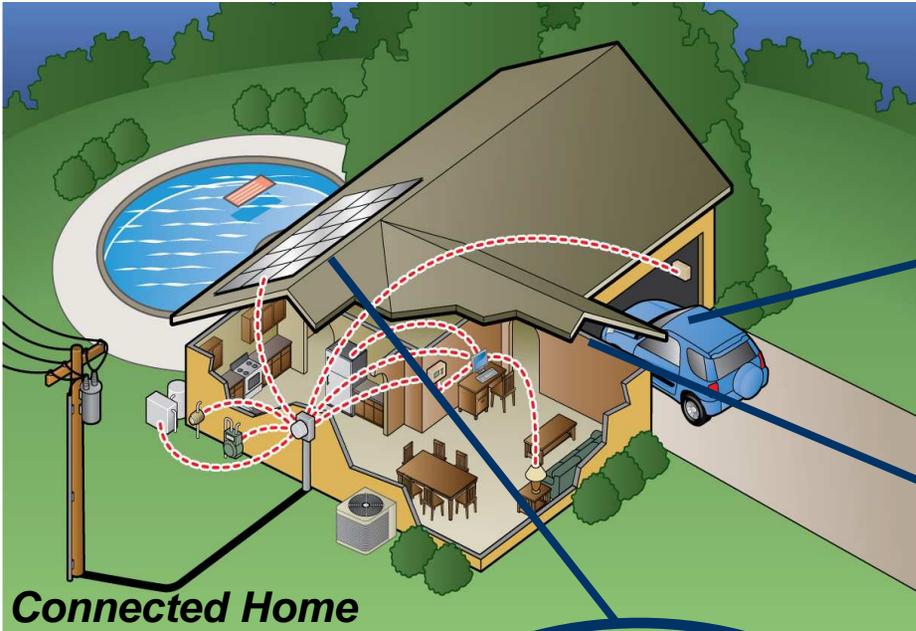


Energy Information drives Energy Conservation and GHG Reductions

Improved Load Management through Edison Smart Connect™ Technologies



And Increase Distributed Energy Resources



**Discrete Metering,
Incentive Programs, and
Demand Response for
PEVs**



**Home Energy Storage
Creates Opportunities
for Increased
Renewables**

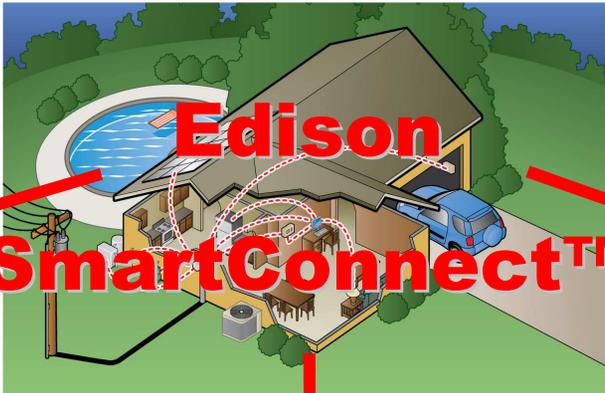


**Enable Net Metering,
Discrete metering
and Integrated
energy management
w/Solar Panel**

Near Term Evaluation Focus With Our Auto Partners



Same battery pack in both mobile & stationary applications could create early volume driving down costs



PHEV Bi-directional Connection
occasional emergency back-up
occasional peak shaving



PV with Home Energy Storage
reduced grid stress
addresses PV intermittency



Home Energy Storage
reduced grid stress
lower customer bill

Lithium-Ion Evaluation and Demonstration Programs



Mitsubishi Heavy Industries
1.5-3 kW residential/
small commercial PSU



AES 1 MW substation energy storage system

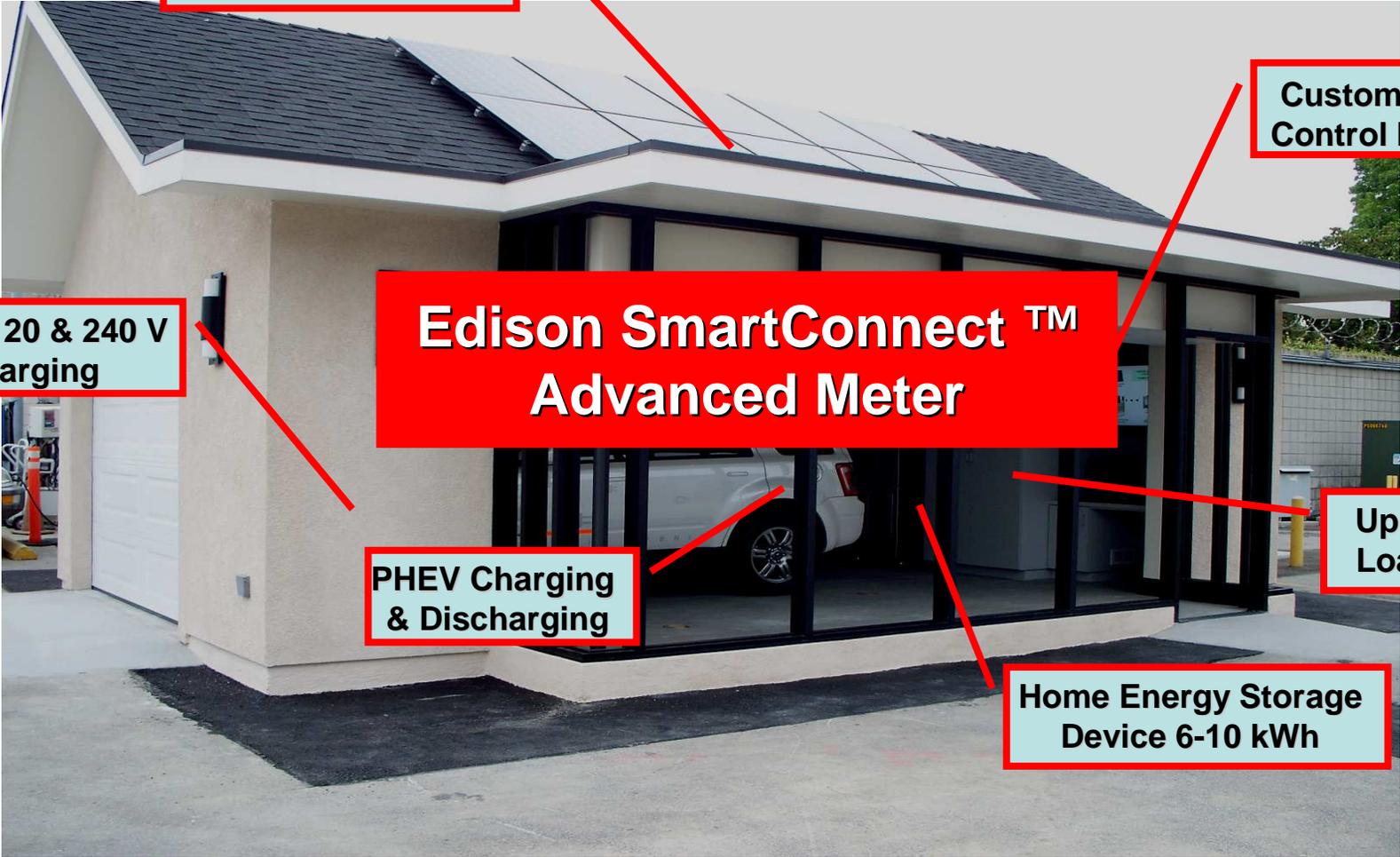
IP&L - Indiana PUC allowed economic development in battery maker
AEP - Several MW stationary battery storage project

SCE Proposed CPUC Filing:
\$3M Residential Stationary Battery Pilot Program

OBJECTIVES:

1. Assess Li-ion technology (battery/controls) availability
2. Validate concept at SCE's EV Technical Center
3. Evaluate customer response to dynamic pricing signals using home PSU
4. Partner w/ battery and controls manufacturers
5. Partner w/ wind and solar manufacturers
6. Assess volume potential and pricing impacts for advanced batteries

SCE's "Future Garage" Systems Study



1-3 kW
Photo Voltaic Panels

Customer HAN
Control Interface

PHEV 120 & 240 V
Charging

Edison SmartConnect™
Advanced Meter

Up to 9 kW
Load Bank

PHEV Charging
& Discharging

Home Energy Storage
Device 6-10 kWh



Summary

- Many types of Electric Transportation are here today
- Both Plug-in Hybrids and Battery EVs are coming 2009 – 2014 from almost all large manufacturers
- Utilities and Automakers have many new partnerships that are working on the details
 - Both industries Need To Be Mindful Of The “Hype”- ***Get The Batteries Driving The Wheels First***
 - Focus On Near Term Issues First (Vehicle Connection & Communication, Intelligent Charging, Energy Storage)
 - Generate Critical Data and Understanding Before We “Launch”
- Utilities are facing several potential new “game changers”
 - Stationary batteries may be a solution to our storage problem
 - Greenhouse gas reductions from ET and other benefits may lead to new business models or opportunities.



Thank You

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